



UNITED STATES MARINE CORPS  
MARINE CORPS COMBAT DEVELOPMENT COMMAND  
QUANTICO, VIRGINIA 22134-5001

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AIR FACILITY ORDER 5100.6A

From: Commanding Officer  
To: Distribution List

Subj: HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE (HERO),  
VOLATILE FUELS, AND PERSONNEL, EMISSION CONTROL (EMCON)  
BILL

Ref: (a) NAVSEA OP 3565/NAVAIR 16-10529/  
NAVEFLEX 0967-LP-624-6010, Volumes I and II,  
Fifth Revision, Electromagnetic Radiation Hazards,  
Hazards to Personnel, Fuel and Other Flammable  
Material and Ordnance

Encl (1) General HERO Safe Separation Distance Requirements  
for MCAF, Quantico  
(2) Minimum Distance from Ordnance for Aircraft UHF  
Transmitters  
(3) Map of MCAF, Quantico Detailing Hazardous Areas

1. Purpose. To promulgate information to minimize hazards of  
electromagnetic radiation (r-f) to volatile fuels and personnel  
and to establish procedures whereby the Hazards of  
Electromagnetic Radiation to Ordnance (HERO) are positively  
controlled in accordance with the reference.

2 Cancellation. AFO 5100.6

3 Information

a. Hazards of Electromagnetic Radiation to Personnel.  
Highly concentrated densities of electromagnetic radiation  
(r-f) energy are capable of causing varying degrees of  
biological damage to the human body. The energy impinging on  
an object in an electromagnetic field may be scattered,  
transmitted, or absorbed. Only the absorbed energy constitutes  
a hazard. The penetration of energy into the body and its  
absorption will depend on the physical dimensions of the body,  
the electrical properties of the tissue and the frequency of  
the (r-f) radiation. The development of systems with high  
power (r-f) transmissions and high gain antennas increase the  
possibilities of biological injury to personnel working in the  
vicinity of these (r-f) systems.

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b. Hazards of Electromagnetic Radiation to Fuel.

The possibility of accidentally igniting fuel vapors by (r-f) induced arcs during fuel-handling operations in proximity to high-powered radio and radar transmitting antennas has been the subject of extensive study and research. Even though the potential fuel hazard from electromagnetic radiation may not be as great as formerly believed, it is still present when handling the volatile JP-5 and motor vehicle or aviation gasolines. Personnel handling fuels should be aware that the potential ignition hazard of fuel vapors by (r-f) exists when the following conditions occur simultaneously:

(1) A flammable fuel-air mixture is present within range of induced arcing.

(2) The arc contains sufficient amounts of energy to cause ignition.

(3) The gap across the arc is a certain minimum distance

c. Hazards of Electromagnetic Radiation to Ordnance (HERO)

(1) The HERO vary greatly with the type of ordnance involved, distance to the radiation source, power, output and frequency of the transmitter. The reference divides all ordnance into the following three categories:

(a) HERO Safe Ordnance. Items that are not susceptible and require general HERO (r-f) restrictions during all phases of normal employment.

(b) HERO Susceptible Ordnance. Items that are susceptible and require (r-f) restrictions for at least some phases of employment.

(c) HERO Unsafe Ordnance. Items that are susceptible and require (r-f) restrictions for some or all phases of employment.

(2) To ensure safety when handling HERO Susceptible or HERO Unsafe Ordnance, precautions must be taken to limit the electromagnetic radiation (r-f). Enclosure (2) indicates the required safe distances of aircraft for UHF transmissions from ordnance. The Airfield Operations Officer, upon notification, causes HERO EMCON Condition to be set which ensures that radiation is held to acceptable levels. The HERO conditions are:

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(a) HERO EMCON CONDITION RED: HERO Unsafe Ordnance is being handled.

(b) HERO EMCON CONDITION YELLOW: HERO Unsafe Susceptible Ordnance is being handled.

### 3 Requirements

a. Personnel Hazard Control. Personnel working with, on or around equipment producing electromagnetic radiation shall become familiar with the provisions set forth in the reference and observe all safety standards/precautions promulgated by higher authority for the type of equipment they are associated with. For the purpose of this Order, any electrical equipment capable of emitting (r-f) radiation which may cause biological damage to the human body is considered a personnel hazard. The following precautions must be taken to ensure that personnel are not exposed to power intensities exceeding the established safe limits as set forth in the reference:

(1) Personnel should not look directly into the beam. Guidance should be sought from cognizant personnel on locating the beam for each antenna installation.

(2) Visual inspection of feed horns, opened ends of wave guides and any opening emitting high intensity electromagnetic energy shall not be made unless the equipment is definitely secured for the purpose of such an inspection.

(3) The use of dummy loads shall be employed where applicable as a load for equipment during testing or checkout, rather than radiating the energy into the surrounding atmosphere.

(4) Highpowered radar beams shall not be directed toward personnel working areas.

(5) Personnel shall observe 'R-F HAZARD' warning signs which point out the existence of microwave radiation hazards in a specific location or area.

(6) All transmitters, stationary and mobile, will be placarded to state: "DO NOT TRANSMIT WITHIN (specified distance for the equipment) METERS (feet) OF ORDNANCE."

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b. Fuel Hazard Control. Personnel engaged in fueling operations will be familiar with and observe the safety precautions of this Order, the reference and the NAVMAT, NAVFAC, and NAVAIR instructions and directives relating hazards to fuels from many sources. The total elimination of (r-f) induced arc hazards to fuels cannot be achieved without placing unacceptable restrictions on flight operations. Although precise criteria has not been fully developed, the following guidance will be adhered to:

(1) Do not energize any transmitter (radar or communications) on the aircraft or motor vehicle being fueled or on adjacent aircraft or motor vehicles during fueling operations.

(2) Do not make or break any static wire, tiedown connection, or any other metallic connection to the aircraft or motor vehicle while it is being fueled. Make all connections before fueling commences, break all connections after fueling is concluded.

c. Ordnance Hazard Control. When ordnance is being assembled/handled, or aircraft are being loaded, downloaded, armed or dearmed in other than the Hazardous Cargo Area, the appropriate HERO EMCON Condition will be set and the following requirements will be set and the following requirements will be met:

(1) HERO EMCON CONDITION RED (Emergency Condition)

(a) Call the Airfield Operations Officer (640-2446) during working hours or the Airfield Duty Officer (640-2441) after working hours and state: "Set HERO EMCON Condition Red for hazardous area (number and location)".

(b) HERO EMCON Condition Red will be issued by broadcast on Automatic Terminal Information System (ATIS), ground control and ground control approach. All Airfield Operations Sections will be alerted by telephone from Flight Clearance as to the condition set and the area involved.

(c) Silence all transmitters in hazardous area involved with the exception of UHF transmitters. UHF transmitters may be utilized only within those distances shown in enclosure (2) by type aircraft. The reference contains safe transmitting distances from HERO Unsafe/Susceptible ordnance by type equipment.

HERO EMCON CONDITION YELLOW

(a) The using activity will notify the Airfield Operations Officer (640-2446) during working hours; or the Airfield Duty Officer (640-2441) after working hours, twenty-four hours prior to implementation time for routine HERO EMCON requirements. State commencement time and automatic expiration time. Requirements for extension of the established expiration time will require thirty minutes notice.

(b) HERO EMCON Condition Yellow will be promulgated by ATIS, ground control and ground control approach. All tenant operations sections will be alerted by telephone, by Flight Clearance as to the condition set and the area involved.

(c) Silence all aircraft transmitters within 23 meters (75 feet) or the placarded distance.

(d) Silence all mobile transmitters within 23 meters (75 feet) or the placarded distance.

(e) Silence all portable (hand-held) transmitters within 8 meters (25 feet) or the placarded distance.

(f) Silence all transmitters on the aircraft during loading evolutions.

(g) Perform no maintenance on aircraft radars requiring emitting (r-f) without energy absorption shields or by marking the safe separation distance from ordnance with suitable stanchions.

4. Hazardous Areas. Hazardous areas are those areas in which materials are handled that may react to electromagnetic radiation, thereby creating a hazardous situation. Specific boundary lines of the hazardous areas are shown in enclosure (3). A general description of these areas and permanent EMCON Condition restrictions are as follows.

a Hazardous Area #1 Area surrounding the AN/CPN-4 RADAR SET

(1) HERO EMCON Condition Red is set in this area during all ordnance assembly operations.

(2) HERO EMCON Condition Yellow is set in this area during all explosive cargo staging operations.

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- b. Hazardous Area #2. Area adjacent to hanger #2105.

(1) HERO EMCON Condition Red is set in this area during all ordnance assembly operations.

(2) HERO EMCON Condition Yellow is set in this area during all cargo staging operations.

6. Procedures. To ensure positive control of HERO during ordnance evolutions, the following procedures are required:

a. No HERO Unsafe Ordnance will be handled on this facility except in an emergency.

b. Ordnance components that become HERO Unsafe during assembly will be assembled in the designated area only. The Ordnance Officer will prohibit transmitters in this area.

7. Responsibilities

a. Airfield Operations Officer

(1) Be responsible for setting and securing HERO Conditions.

(2) Ensure that taxiing/landing aircraft are informed when HERO Condition Yellow is set in the arm/disarm areas.

(3) Maintain liaison with activities to resolve any conflict in the requirements contained in the Order.

(4) The Airfield Operations Officer is designated as the RAD-HAZ (Radiation-Hazard) Control Officer and will thoroughly familiarize himself with the reference applicable to this Order. Additionally, he will perform the following tasks:

(a) Coordinate with the RAD-HAZ Control Officer of visiting organizations, assisting them where possible, on all radiation-hazard matters.

b) Ensure that radiation-hazard areas are properly closed

(c) Maintain a file of electromagnetic emitters currently authorized aboard Marine Corps Air Facility, Quantico.

b. Department Heads and Commanding Officers of Visiting Units will comply with the following:

(1) Ensure that the EMCON conditions as set forth in this Order are enforced.

(2) Ensure that all newly assigned equipment which is capable of electromagnetic radiation in excess of five watts peak envelope power (PEP) is officially reported to the Ground Electronics Maintenance Office prior to activation of the respective equipment.

(3) Ensure that all electronic emitters exceeding five watts PEP are clearly marked as a radiation-hazard.

(4) Ensure that the entire circumference (or danger area) around all assigned emitters is clearly posted to prevent personnel from entering areas which may be hazardous to health as defined in the reference or as respective equipment publications dictate.


(5) Ensure that all assembly and disassembly of HERO Unsafe munitions is performed in the Hazardous Cargo Area.

(6) Ensure that all loading and unloading of aircraft containing HERO Susceptible or HERO Unsafe munitions is performed in the Hazardous Cargo Area.

(7) Ensure that no HERO Unsafe Ordnance is allowed on the assigned flight line area at any time.

(8) Ensure that all ordnance-laden aircraft have the ordnance in a HERO Safe configuration prior to taxiing to and from the Hazardous Cargo area.

7. Action. The provisions of this Order apply to all organizations at Marine Corps Air Facility. Commanding Officers, officers in charge, and department heads will issue supplementary instructions applying to their own equipment, personnel, and operational procedures to ensure compliance with this Order and the reference.

  
L. L. LARSON

DISTRIBUTION: B

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GENERAL HERO SAFE SEPARATION DISTANCE REQUIREMENTS FOR  
MARINE CORPS AIR FACILITY, QUANTICO

1. The following requirements apply to all shore station ordnance operations involving presence, handling and loading, or as otherwise specified in NAVSEA OP3565/NAVAIR 16-1-529/NAVEFLEX 0967-LP-624-6010, latest revision.

a. All visiting organizations aboard MCAF, Quantico will notify the Airfield Operations Officer when HERO EMCON conditions must be set.

b. Conduct all handling and loading operations so that the nearest part of ordnance or any metallic structure or subject attached to the ordnance (i.e., aircraft, handling equipment, tow vehicle, etc.) is at least three meters (10 feet) from the nearest extremity of any communication antenna radiating more than five watts of power.

c. If the preceding safe distance requirements must be violated for any ordnance operation, the transmitting antenna must be silenced.

d. Transportation of ordnance on MCAF Quantico requires the same safety requirements and (r-f) restrictions specified for that particular item during normal handling operations. When ordnance systems are disassembled or when they have exposed EEDs, exposed firing circuits or exposed wiring during transport operation, the 'HERO UNSAFE ORDNANCE' restrictions as directed by the reference apply. The 'HERO SUSCEPTIBLE ORDNANCE' listed in the reference may be protected from hazardous (r-f) environments by use of all metal containers which completely enclose the weapons.

ENCLOSURE (1)



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MINIMUM DISTANCE FROM ORDNANCE  
FOR AIRCRAFT UHF TRANSMITTERS

<u>TYPE AIRCRAFT</u>	<u>HERO EMCON RED</u>	<u>HERO EMCON YELLOW</u>
TA-4F	18 meters 60 feet)	6 meters 20 feet
A-6	21 meters 70 feet	5 meters 15 feet
F/A-18	27 meters 90 feet	9 meters (30 feet
UH-1N	18 meters (60 feet	6 meters (20 feet)
UH-1D	9 meters 30 feet)	3 meters 10 feet)
CH-46	9 meters (30 feet)	3 meters (10 feet)
CH-53	9 meters 30 feet)	3 meters (10 feet)
AH-1T	18 meters (60 feet	6 meters (20 feet)
AH-1J	18 meters (60 feet	6 meters (20 feet)

ENCLOSURE (2

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